REMARKS

Claim 1 has been amended and claim 10 has been cancelled. Claims 1-9 and 11-22 remain in the application.

Claims 1-8 and 10-22 were rejected under 35 U.S.C. 103(a) as being unpatentable over SOMMERMEYER et al in combination with KOMAI et al; and claims 1-2, 4-7, 9-15 and 19-22 were rejected under 35 U.S.C. 103(a) as being unpatentable over SOMMERMEYER et al in combination with KOMAI et al in view of SMOLKA et al.

Claim 1 has been amended to incorporate the subject matter of claim 10, restricted to molecular weights ranging from 60,000 to 600,000; and specifying a flow rate of about 5 to 20 cm/min. Bases for the amendments are found in the specification at page 2, second paragraph, and at page 11, third paragraph.

Additionally, Applicant's performed experiments to prove that the molecular weight distribution of the starch hydrolysed according to a method of the present invention is narrower than the molecular weight distribution of a starch hydrolysed according to U.S. 5,218,108. Therefore the same starting material was used. hydrolysed and the molecular weight distribution was measured by GPC, using a light scattering detector and a detector measuring the refractive index. The mass of the analysed samples injected in the GPC-apparatus were me same. To repress association between the starch molecules the GPC was performed in an aqueous saline solution.

For analysis of the molecular weight the detector signal is plotted against volume eluted. According to the working principle of GPC, substances having a high molecular weight are eluted at low volumes while substances having a low molecular weight are eluted at high volumes. At volumes greater than about 10 mL the added salt is detected Thus the detector signal derived for eluated volumes greater than 10 mL does not represent starch

molecules.

In the attached graph the red curve represents the starch derived from the batch hydrolysis (LSH10.01) while the blue curve (8-05.01) represents the starch derived from the continuous hydrolysis according to a method of the present invention. It can be seen from the chromatograms obtained that both samples have a similar average molecular weight (starch derived from batch hydrolysis 114 900 Dalton, starch derived from the continuous hydrolysis 115 000 Dalton). Further it can be seen from me analysis that the blue curve is narrower, thus showing that the molecular weight distribution of the starch derived from the continuous method is narrower. The respective chromatograms are enclosed in duplicate

In the specification on page 2, second paragraph, EP-A1 0 402 724 is mentioned which discloses the breakdown of hydroxyethyl starch to a product that can be used as plasma expander. According to claim 1 of EP-A1 0 402 724 hydroxyethyl starch which can be used as plasma expander comprises a mean molecular weight of 60,000 to 600,000. Thus present claim 1 is restricted to molecular weights in the range of 60,000 to 600,000.

Further in the application it is clearly distinguished between main hydrolysis and fine hydrolysis. In the present case during the main hydrolysis the reaction mixture is conducted against gravity without mixing. This guarantees uniform hydrolysis conditions for each layer. Therefore the molecular weight distribution of the starch to be hydrolysed in the claimed process during main hydrolysis is more uniform than during batch process.

The disadvantage of the main hydrolysis is that the process of the main hydrolysis cannot be stopped at a certain mean molecular weight as for example the batch process can, because during

continuous hydrolysis the molecular weight within the reactor is not homogeneous. Therefore the molecular weight of the starch to be reached after the stop of the main hydrolysis for security reasons is adjusted to values slightly above the desired final molecular weight of the final product. Therefore as a second step, the step of the fine hydrolysis is applied where the partly hydrolysed starch is mixed by use of mixing elements and further hydrolysed to the desired final molecular weight. With these reactors for the fine hydrolysis it is then possible to conduct the hydrolysis to a predetermined end value. During the fine hydrolysis step the degree of the hydrolysis may be determined and controlled by viscosity measurements (page 8, line 29 to page 9, line 11). By incorporating subject matter of claim 10 into claim 1 now, as discussed above, the molecular weight of the final product is restricted to molecular weights suitable for that application, which is 60,000 to 600,000.

Concerning flow against gravity applicant's disagree with the Examiner's opinion. KOMAI explicitly teaches the mixing between the different layers due to reduced flow rate near the wall, which cancels out the effect of the temperature drop at the wall on speed of the hydrolysis (column 4, lines 15-18).

In contrast in the present application surprisingly no mixtures of the layers occurs at all. This may be explained by he reduced flow rate (only 0,08 to 0,33 cm/sec (page 11, lines 17-24) in contrast to 1 to 3 cm/sec at KOMAI) and therefore reduced friction but also due to the higher viscosity of the hydrolysate because of the higher molecular weight of the final product.

Therefore it is believed that the claimed process is not obvious over a combination of KOMAI and SOMMERMEYER. Therefore the continuous ethoxylation of starch and starch derivatives by a procedure according to amended claim 1 is novel and not obvious over the cited state of the art. Therefore the way of ethoxylation of the starch, as for example disclosed by

SMOLKA, is not relevant concerning obviousness.

In view of the above, it is believed that all remaining claims are now in condition for allowance and a notice to that effect is earnestly solicited.

Respectfully submitted,

Klaus SOMMERMEYER et al

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By: ______________________

Richard L. Fix
Reg. No. 28,297

STURM & FIX LLP
206 Sixth Avenue, Suite 1213
Des Moines, Iowa 50309-4076
Telephone: (515) 288-9589
Facsimile: (515) 288-5311